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ABSTRACT

This paper presents an evaluation of Colorado's educational needs related to economic competitiveness and to providing equal access to higher education. The paper looks at the Colorado economy's shift toward an information/service based system. Thus the paper argues, the educational needs of Colorado's workforce are higher and to maintain its competitive edge, those needs must be met. Also discussed are demographic shifts changing the makeup of the future workforce which will be older, more female and more diverse. Also, the paper argues, demographic shift will not lead to an equitable distribution of educational participation without efforts to increase the participation of previously disenfranchised individuals. Consequently a statewide ethnic minority graduation goal of 18.6 percent by the year 2000 has been adopted. If that goal is funded by the state, the public institutions would need to graduate an additional 1,484 minority graduates above current projects in the year 2000. The paper argues that if Colorado public educational institutions are to continue to produce their current percentage of the demand for sub-baccalaureate and baccalaureate degrees, the estimated annual cost to the state for public institutions to meet that demand is $45 million above the costs already estimated in the higher education demand projections. Ten references are included. (JB)

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As a state, what level of participation in postsecondary education is necessary to assure a just and economically successful society?

Executive Summary

Future workforce needs are changing as the United States moves from a manufacturing based economy to a information/service dominated economy. A higher number of the jobs created by the shift to a information/service dominated economy require different educational levels and job skills.

The transition of Colorado to a more information/service based economy is apparently ahead of the national transition, and the educational needs of Colorado's workforce are likely higher than national needs. The share of Colorado's jobs in the goods producing sector was 23.5% in 1980, 18.2% in 1990, and is projected to fall to 17% by the end of the century. In 1989, 23.4% of the non-agricultural jobs in the United States were in the goods producing area. If Colorado is to maintain its competitive edge, then the educational needs of Colorado's workforce must be met.

At the same time that the workforce needs are changing, the state is undergoing demographic shifts that will change the makeup of the future workforce. The changes include a workforce that will be older, more female, and more minority.

Evidence from past performance suggests that these demographic shifts will not lead to an equitable distribution of educational participation without efforts to increase the participation of previously disenfranchised individuals. In order to meet the projected educational demand of Colorado's 2000 workforce, an estimated 31,252 sub-baccalaureate and 18,364 baccalaureate degrees will be needed annually between 1990 and 2000. CCHE higher education demand projections indicate that the state's postsecondary education system (public and private colleges) produce only about 50% of the sub-baccalaureate and 90% of the baccalaureate degrees required to meet future workforce needs. The public institutions have historically produced 41% of the sub-baccalaureate and 83% of the baccalaureate degrees in the state. If that share is maintained, the estimated annual cost to the state for the public institutions to meet the workforce demand is $45 million above costs already estimated in the CCHE higher education demand projections.

To address the issue of minority under-representation in Colorado public higher education, the Commission adopted a statewide ethnic minority graduation goal to increase the minority share of graduates to 18.6% by the year 2000. If CCHE projected enrollment increases are funded by the state, an estimated 17.8% of the FY 2000 graduates would be minorities, at an annual cost of $12.2 million. To meet the FY 2000 affirmative action goals, the public institutions would need an additional 218 minority graduates at a cost of $4.1 million annually.

INTRODUCTION

This policy analysis paper was prepared to assist the Colorado Commission on Higher Education as it evaluates educational needs related to economic competitiveness and providing equal access to higher education for all Coloradans. Many of the concepts and observations made in this document were identified in other publications including *Workforce 2000, America's Choice, Jobs for Colorado's Future, Years of Challenge, and Meeting Economic and Social Challenges*. This report is an attempt to bring together these concepts and evaluate how they relate to Colorado.

Two basic themes are prevalent as Colorado enters the last decade of this century. Future workforce needs are changing as the state's economy moves from a manufacturing based one to an information/service dominated one. At the same time that the workforce needs are changing, the state is experiencing demographic shifts that will change the makeup of the future workforce. History suggests that these demographic shifts will not lead to an equitable distribution of educational participation without intervention of efforts to increase the participation of previously disenfranchised individuals.

The literature reviewed indicates two directions in which the economy can be directed. One direction is the status quo: Colorado can maintain or change slightly its current job mix and skills level. While some jobs require advanced training, increasing emphasis is on technical training. The second direction takes Colorado to another level of attainment: One in which the state becomes highly competitive. In this scenario, jobs are created in both the goods and the service sectors. These jobs, along with current positions, require more and better skills in order to move Colorado forward.

According to *Jobs for Colorado's Future*, "Losing the mid-level occupations and living with growing economic disparities will have tremendous implications for Coloradans in terms of job opportunities, earnings potential, unemployment and underemployment. These trends are likely to continue unless the state can maintain occupations requiring higher skills."[1] If Colorado wants to remain economically competitive in the global market of the future, the second scenario indicated above is the only choice.

COLORADO'S CHANGING ECONOMY AND WORKFORCE NEEDS

The State of Colorado economy, like the national economy, is becoming less manufacturing oriented and more information/service oriented. Between 1980 and 1990, the share of manufacturing jobs compared to total jobs in the Colorado economy declined from 23% to 18%. This trend is projected to continue into the next century. Table 1 illustrates this transition.

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[1] *Jobs for Colorado's Future Preliminary Action Plan Executive Summary*, October 1989, Denver, Colorado, p.3.

As the state's economy changes, so will the educational needs and skills of workers, since information/service jobs usually require more education than manufacturing jobs do. According to *America's Choice*, in 1984 the median educational level required for U.S. jobs was 12.8 years. Because of the anticipated transition of the economy, the median educational level is expected to rise to 13.5 years by the year 2000.

Ranking jobs by skills required, rather than by educational level, illustrates the same point. According to *Workforce 2000*, while only 24% of today's jobs require significant math, language, and reasoning skills, 40% of new jobs will require these skills.

These changes require workers to have broad sets of skills which enable them to adapt quickly to new technologies, learn new operating methods at a rapid pace, and work closely with others. Workers that do not have the ability to adapt, and firms that operate as they have in the past will not be economically competitive in the future.

Table 1
Colorado Non-Agricultural Wage and Salary Employment

Industry Sector	Number			% of Total		
	1980	1990	2000	1980	1990	2000
Goods Production	293,700	276,100	312,200	23.5%	18.2%	17.0%
Mining	36,200	19,900	20,600	2.9%	1.3%	1.1%
Construction	77,100	63,200	81,300	6.2%	4.2%	4.4%
Manufacturing	180,400	193,000	210,300	14.4%	12.7%	11.5%
Services	957,500	1,244,100	1,519,700	76.5%	81.8%	83.0%
F.I.R.E.	76,400	97,200	104,900	6.1%	6.4%	5.7%
Trade	304,800	371,400	432,000	24.4%	24.4%	23.6%
Trans. & Util.	79,300	96,000	116,000	6.3%	6.3%	6.3%
Other Services	253,500	403,900	547,000	20.3%	26.6%	29.9%
Government	243,500	275,600	319,800	19.5%	18.1%	17.5%
Total	1,251,200	1,520,200	1,831,900	100.0%	100.0%	100.0%

Source: CBEF Review, Winter 1992

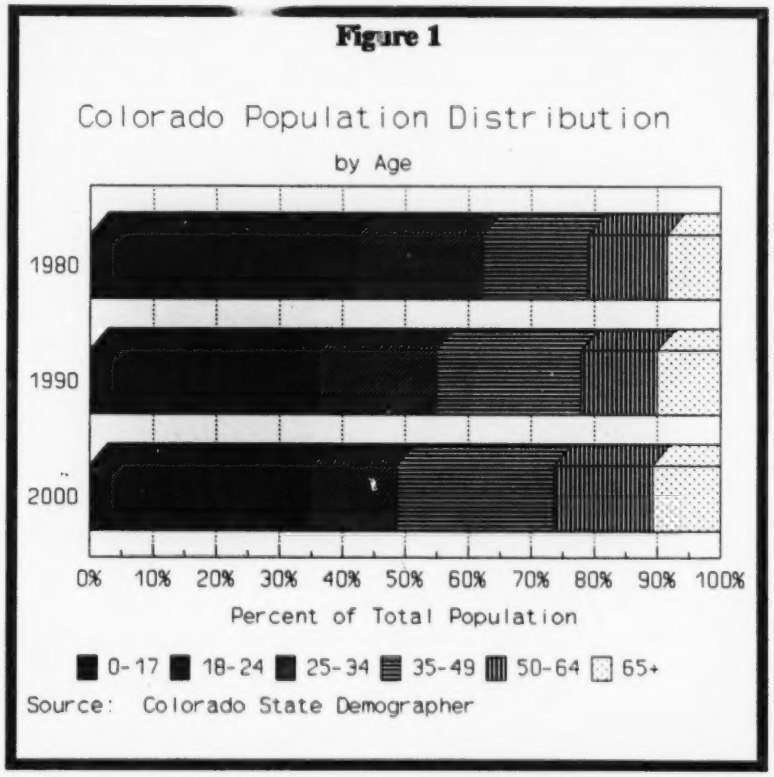
COLORADO'S CHANGING DEMOGRAPHY

In addition to the changing economy, the Colorado workforce also faces major demographic changes. The workforce of the future will be older, more female, and more minority than today. In order to assure an effective workforce in the future, the educational system must respond to these demographic changes.

Age of the workforce

The future Colorado workforce will be older than today's workforce. The number of 18-24 year-olds (the primary new workforce entrants) is declining, while older age groups are increasing. By the year 2000, the share of 18 to 24 year-olds compared to other age groups will drop to just over 10%, (down from 14% in 1980). The median age of the workforce will only begin to decline after the turn of the century, when an influx of young workers are expected to replace large numbers of retirees. Figure 1 displays the age distribution of Colorado for 1980, 1990, and 2000.

Figure 1

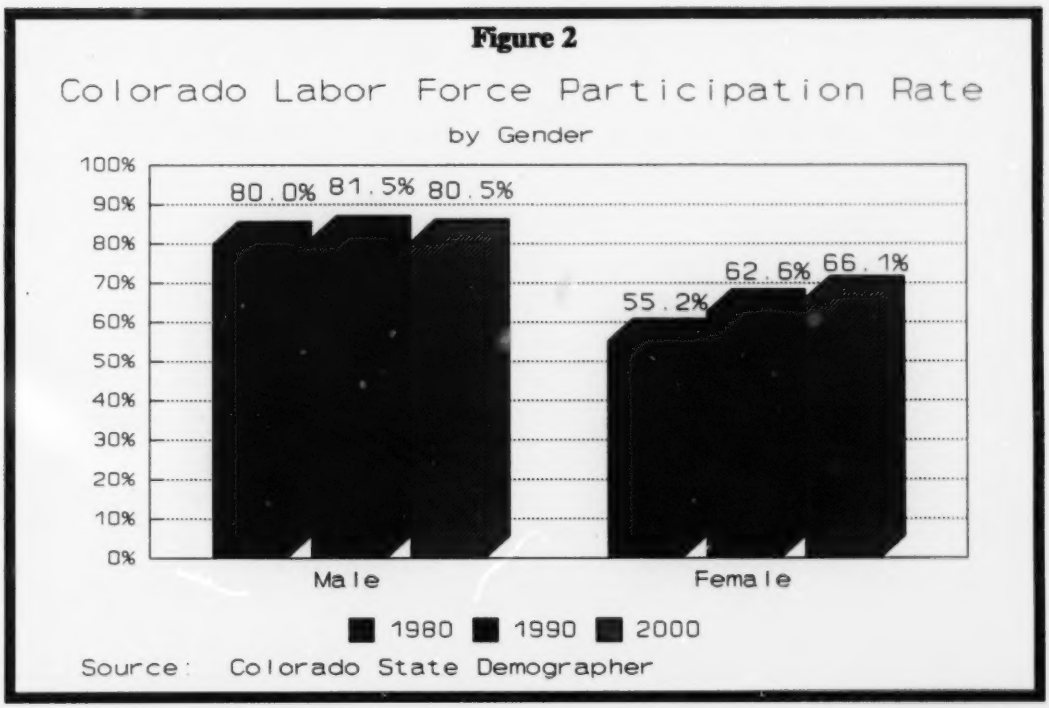


Gender of the workforce

A larger share of the new labor force entrants will be women. The Colorado female labor force participation rate increased from 55.2% in 1980, to 62.6% in 1990, and is expected to rise to 66.1% by the end of the decade. The male labor force participation rate, which increased slightly between 1980 and 1990, is expected to drop between now and the year 2000, as Figure 2 indicates.

As the workforce becomes more female, many policies that were established when males were the primary source of family income need to be re-evaluated and reformed to allow women to participate more fully in the labor force. These policies include providing time off for both parents, flexible hours, sick leave to care for children, and day care.

Figure 2



Ethnicity of the workforce

Ethnic minorities are becoming a larger share of the Colorado population as Table 2 indicates. By the year 2000, nearly 22% of the state's population are projected to be ethnic minorities (up from 17% in 1980).

This demographic shift has serious implications for the Colorado workforce because of current ethnic minority educational attainment levels (Table 3). In 1990, only 13% of Colorado ethnic minorities (25 years and older) had college degrees, compared to 29.7% of the rest of Colorado 25+ population. Of even greater concern is the ethnic minority population without high school diplomas. In 1990, 34.1% of ethnic minorities did not have a high school diploma, compared to 12% of the rest of the Colorado population (Table 3).

The apparent mismatch between increasing numbers minority workers and their educational achievement must be addressed in order to assure an economically viable future economy.

Further complicating this mismatch is the fact that ethnic minorities, as a whole, tend to be more economically disadvantaged than the rest of the Colorado population. In 1990 over 24% of ethnic minorities were below the poverty level, compared with roughly 9% of the rest of the Colorado population. Table 4 illustrates this point. This data demonstrates the need for providing adequate financial assistance to assist minorities in receiving an education to prepare them for the workforce.

Table 2
Colorado Population by Ethnicity

July 1	Minority Group					White & Other	Total
	Black	Nat Am	Asian	Hispanic	Summary		
1980	102,349	21,152	34,601	335,712	493,814	2,414,222	2,908,036
Percent	3.5	0.7	1.2	11.6	17.0	83.0	100.0
1990	133,275	27,804	59,920	410,813	631,812	2,665,752	3,297,564
Percent	4.0	0.8	1.8	12.6	19.2	80.8	100.0
2000	167,723	33,236	86,111	503,067	790,137	2,832,729	3,622,866
Percent	4.6	0.9	2.4	13.9	21.8	78.2	100.0

Table 3
Educational Attainment of the 25 and Older Colorado Population by Ethnicity

Census	Minority Group					White & Other	Total
	Black	Nat Am	Asian	Hispanic	Summary		
1980							
< H.S.	25.5%	29.5%	22.9%	51.4%	42.8%	17.9%	21.3%
H. S. Grad.	34.9%	32.0%	30.8%	28.8%	30.4%	35.2%	34.6%
1-3 Yrs Coll	25.8%	25.8%	18.1%	12.9%	16.6%	21.8%	21.1%
4+ Yrs Coll	13.8%	12.8%	28.1%	6.9%	10.2%	25.0%	23.0%
1990							
< H.S.	19.2%	26.1%	21.7%	41.7%	34.1%	12.0%	15.6%
H. S. Grad.	26.8%	28.6%	22.0%	27.7%	27.0%	26.4%	26.5%
1-3 Yrs Coll	36.8%	33.3%	24.2%	22.1%	26.0%	31.9%	30.9%
4+ Yrs Coll	17.1%	12.1%	32.1%	8.6%	12.9%	29.7%	27.0%

Table 4
Colorado Population Below Poverty Level by Ethnicity and Age

Age Group	Minority Group					White & Other	Total
	Black	Nat Am	Asian	Hispanic	Summary		
Total 1980 Census	21.4%	23.3%	16.6%	20.1%	20.2%	8.8%	10.1%
Total 1990 Census	23.9%	27.9%	16.0%	25.5%	24.4%	8.7%	11.7%
1990 Census by Age							
< 5	38.8%	46.0%	19.6%	37.7%	36.8%	11.2%	17.9%
5	40.3%	33.8%	20.1%	34.9%	34.8%	10.0%	16.5%
6-11	34.6%	34.3%	15.3%	33.0%	32.0%	9.8%	15.3%
2-17	25.8%	26.1%	17.7%	27.0%	25.9%	8.1%	12.5%
18-64	18.5%	24.8%	15.4%	21.0%	20.1%	8.1%	10.3%
65-74	24.2%	21.5%	13.4%	22.4%	21.7%	6.8%	8.5%
75+	29.2%	16.8%	14.8%	29.2%	27.8%	13.8%	15.1%

IMPLICATIONS OF COLORADO ECONOMY AND WORKFORCE NEEDS ON COLORADO POSTSECONDARY EDUCATION

Shortage of workers at some skill levels

America's Choice **pointed to the need to raise the educational/skill level of the entire population in order to improve productivity and remain economically competitive. Colorado data illustrates an imbalance between the demands of the workforce and the supply of trained workers by the year 2000. As Table 5 shows, the Colorado workforce will need a supply of slightly over 2 million workers by the year 2000. The majority of these workers (approximately 940,000) will need more than a high school education, but less than a four-year degree, while roughly 690,000 will need four-year degrees. The remainder of the jobs will require no more than a high school education.**

Comparing this demand with estimated supply of educated workers reveals a significant mismatch. While enrollment projections indicate that the *supply* of four-year graduates will nearly match the *demand* for four-year graduates, projections indicate a significant shortage of students earning less than a four-year degree. If students enroll as projected in *CCHE Projection of Demand for Colorado Higher Education FY 93 - 02*, approximately 16,000 new employees with one to three years of college will be available for the workforce, leaving a shortage of 15,000 suitably trained workers annually. The demand for workers with college degrees (18,364) will only slightly outnumber the projected supply (16,590), a shortage of only 1,774. Table 6 illustrates the projected supply and demand by educational level.

Assuming, then, that the educational needs of the future workforce will be substantially higher than current needs, additional expansion of the postsecondary system is necessary. Presuming that the public/area vocational/private distribution of degrees remain constant, the average annual 1-3 year degrees/certificates would need to increase by 15,079[2] (6,160 for the public institutions, 4,826 for area vocational schools, and 4,093 for private institutions). The annual average four-year degree output would need to rise by 1,774[3] (1,471 for the public institutions and 303 for the private institutions).

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[2]The annual demand of 31,252 minus the "All Things Remaining the Same" projections of 16,173 (31,252 - 16,173 = 15,079).

[3]The annual demand of 18,364 minus the "All Things Remaining the Same" projections of 16,590 (18,364 - 16,590 = 1,774).

Table 5
Educational Attainment of the Colorado Labor Force

Educational Attainment	1980 Census	1990 (Estimated)	2000 (Projected Demand)
% Distribution			
High School or Less	49.3%	35.7%	22.0%
1-3 Years College	25.2%	35.6%	45.0%
4+ Years College	25.5%	28.7%	33.0%
Number			
High School or Less	707,529	626,856	458,392
1-3 Years College	361,289	625,100	937,620
4+ Years College	364,913	503,943	687,588
Total	1,433,731	1,755,899	2,083,600

Table 6
Higher Education Training to Meet Colorado 2000 Labor Force Needs
Average Annual from 1990 to 2000

Educational Level	Projected Supply[4]	Projected Demand[5]
1-3 College	16,173	31,252
4+ College	16,590	18,364

[4]Assumes all graduates are entering the labor force and their education fields meet workforce needs.

[5]Generated by subtracting the 1990 levels by educational attainment from the 2000 estimates and dividing by 10.

Cost to the state of producing the appropriate mix of workers

The most conservative estimate of additional state support required to meet Colorado workforce needs is $45 million[6] annually, assuming that the state provides adequate funding of approximately $100 million for previous enrollment.

It is important to note that the estimates are based on an average annual need between 1990 and 2000. Since 1990, the higher education system has not produced sufficient degrees to meet that average annual demand. Therefore, because Colorado's educational supply is falling behind demand, it has a lot of catching up to meet the demand.

While some of the new labor force entrants will come from outside the state, we can no longer expect to import a significant portion of the state's future workforce. In order to be economically competitive in a global market, the educational and skill levels of the workforce will need to be advanced. During the 1990's, demographic shifts mean that most of the new labor force entrants will be from groups that have not traditionally participated in higher education equal to their share of the population nor at a level that will allow them to be competitive in the workforce. Unless Colorado brings these groups into equal participation, the state's economy will not be economically competitive in the future. According to *Workforce 2000 and Beyond*, "untrained, low skilled workers using outdated plant and equipment will command only poverty wages on the worldwide labor market. No nation has produced a highly qualified workforce without first providing its workers with a strong general education."[7]

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[6]Assume individuals in the 1-3 year degree/certificate would be in the system an average of 2 years, and the four-year degree individuals would be in the system 4 years. Annual cost: (6,160 x $2,225 x 2) + (1,471 x $3,004 x 4) = $45,087,536. In order to continually produce the required degrees, an average of 2 students (a freshman and a sophomore) would be required in the system for each 1-3 year degree. As the sophomore completed the program, the freshman would move up to sophomore and be replaced by a new student. For the four-year degrees, 4 students (a freshman, sophomore, junior and senior) would be required in the system to continually produce the desired degrees. The estimated FY 1992-93 annual average cost to the state for having a student enrolled in a 1-3 year degree/certificate program is $2,225, and $3,004 (average estimated general fund per student for public universities and colleges excluding research universities) for four-year degree programs. Multiplying the annual cost of adding the new individuals needed indicates that the first year cost would be $13.7 million for the 1-3 year programs and $4.4 million for the four-year degrees. First year cost: (6,160 x $2,225) + (1,471 x $3,004) = $18,124,884. Additional individuals would be added in the second year for the 1-3 year degree/certificate programs, and a second, third, and fourth year for the four-year programs. Once sufficient individuals are in the system to continually produce the needed degrees, then the state could expect to annually pay $27.4 million for the 1-3 year programs and $17.7 million for the four-year degrees.

[7]*America's Choice*, June 1990, National Center on Educiaton and the Economy, Rochester, New York, P.3

Underrepresentation of ethnic minorities in the postsecondary education system

In addition to the apparent workforce/educational preparedness imbalance facing Colorado, the state also faces a mismatch between the ethnicity of the workforce and the educational preparedness of Colorado minority populations. As noted earlier in this paper, ethnic minorities are becoming a larger share of the Colorado population. Of concern is the fact that, although the proportion of minorities enrolled in Colorado postsecondary education is increasing, their enrollment is well below their proportion of the total Colorado population. In fall 1991, Colorado ethnic minorities were 15% of the total in-state enrollment (Table 7). Of even greater concern is the alarming drop-out rate of ethnic minorities. Even though more and more minorities are enrolling in postsecondary education, they are discontinuing their education at a much higher rate than white students. A recent CCHE study[8] found that only 28% of Colorado ethnic minorities who enrolled full-time in four-year colleges and universities had completed their degrees (or were still enrolled) in 1991. By comparison, 41% of colorado white students who enrolled full-time in 1986 were still enrolled or had completed their education. The minority drop-out rate at community colleges is greater than that of white students, but the difference is less dramatic than at four-year colleges. Approximately 12% of ethnic minorities who enrolled full-time in 1986 at community colleges had either received their certificate for associate degree, transferred to a four-year college, or sere still enrolled in 1990, compared to 17% of white students. Also of concern is the fact that in Colorado the minority share of certificates and degrees decreases as the level of degree increases. Figure 3 illustrates this point.

This data demonstrates the necessity of achieving equal participation of ethnic minorities in postsecondary education in order to assure an economically viable future economy. In order to achieve this goal, efforts must be taken to alleviate the obstacles that effect participation, retention, and success.

In addition to other factors affecting the educational success of minorities, the importance of campus climate and adequate student financial assistance should not be overlooked. Research shows that one of the most important elements of a supportive campus climate for minorities is an ethnically diverse faculty and staff that serve as role models. Although minorities were nearly 16% of the total 1992 full-time employees, and 9% of faculty at public postsecondary institutions (Table 8), their share is well below the level needed to reflect the diversity of the general population. In terms of student financial assistance, although minorities were approximately 15% of 1991 postsecondary education enrollment, they were 20% of student aid recipients. This fact illustrates the disproportionate financial aid needs of ethnic minorities.

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[8] *Completion and Persistence Report, Colorado Public Higher Education Fall 1986 through Fall 1991*

Table 7
Headcount Enrollment by Ethnicity
Colorado Public Institutions

Census	Minority Group					White & Other	Total
	Black	Nat Am	Asian	Hispanic	Summary		
In-State							
Fall 1987	3,196	904	2,936	9,021	16,057	124,719	140,776
Percent	2.3	0.6	2.1	6.4	11.4	88.6	100.0
Fall 1991	4,648	1,518	4,117	14,775	25,058	142,778	167,836
Percent	2.8	0.9	2.5	8.8	15.0	85.0	100.0
Total							
Fall 1987	3,558	1,277	3,471	9,683	17,989	141,816	159,805
Percent	2.2	0.8	2.2	6.1	11.3	88.7	100.0
Fall 1991	5,430	2,098	4,961	15,813	28,302	164,830	193,132
Percent	2.8	1.1	2.6	8.2	14.7	85.3	100.0

Figure 3

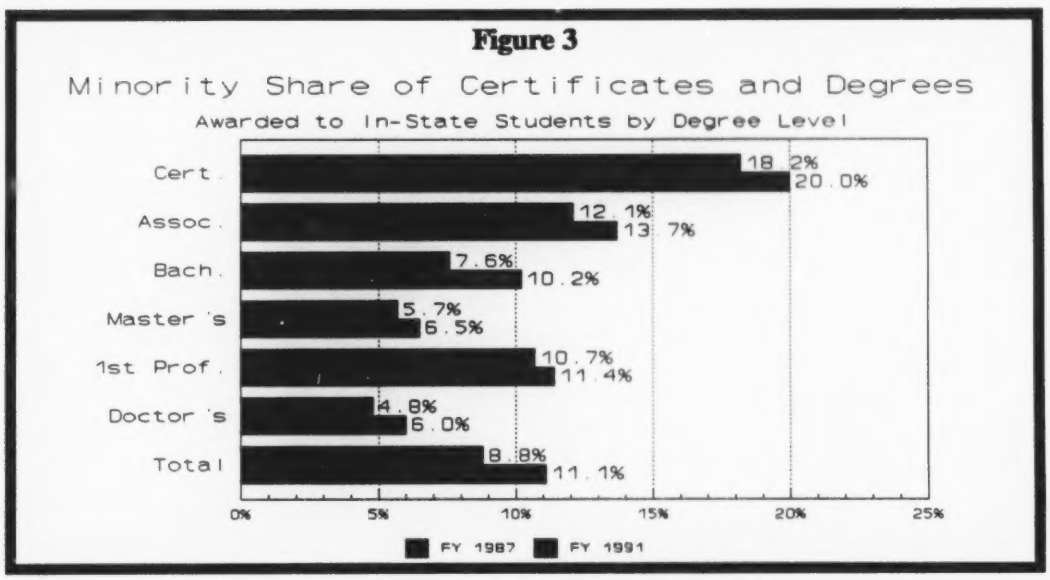

Table 8
Full-Time Employment by Ethnicity
Colorado Public Institutions

Census	Minority Group					White & Other	Total
	Black	Nat Am	Asian	Hispanic	Summary		
Faculty							
FY 1989	73	26	157	180	436	5,472	5,908
Percent	1.2	0.4	2.7	3.0	7.3	92.7	100.0
FY 1992	112	34	248	231	625	6,180	6,805
Percent	1.6	0.5	3.6	3.4	9.1	90.9	100.0
Total							
FY 1989	640	102	455	1,445	2,642	14,696	17,338
Percent	3.7	0.6	2.6	8.3	15.2	84.8	100.0
FY 1992	565	144	514	1,585	2,808	14,765	17,573
Percent	3.2	0.8	2.9	9.0	15.9	84.1	100.0

Cost to the state of achieving full minority representation in postsecondary education

Ensuring increased retention and graduation of minorities in the postsecondary education system has significant fiscal implications for the state. Increased numbers of minorities (like increased enrollment of non-minorities) requires additional state resources. In addition, because minorities tend to be more economically disadvantaged than non-minorities, as more minorities enroll and stay in college, additional need-based student financial aid will be required.

CCHE and the higher education community have established a goal to increase the minority graduation rate to 18.6% by the year 2000. This goal requires an increase of 1,484[9] minority graduates above the CCHE enrollment projections for the year 2000. The most conservative estimate of additional state support required to meet this increase is approximately $4 million more for the first year, and $14 million in each succeeding year through 2000. All but $2 million of this amount would be covered by fully funding projected enrollment increases.

In addition, increased state-funded student aid would be required. $2 million in state financial aid would be necessary to support the additional 1,484 minority students in the

[9]Degrees required minus FY 2000-FY 91 Graduation Distribution (4,171 - 2,687 = 1,484). Assuming the distribution of new degrees required is the same as the total degrees, then 469 (1,484 x .316) 1-3 year and 1,015 (1,484 x .684) four-year degrees/certificates would be needed.

system, and $4.1 million annually[10] to meet the minority graduation goals. Table 8 illustrates this need.

Table 8
Additional Financial Aid Needed in FY 2000
to Support Increased Minority Participation

Element	1-3 Year Degree/Certificate	4-Year Degree
Additional Minority Degrees Required to Achieve Statewide Goals	469	1,015
Percentage of Additional Minority Students Projected to be Need Eligible	54.8%	54.8%
Need Eligible Pool of New Students	257	556
Percentage of Need Eligible Pool Projected to Receive State Aid	52.2%	52.2%
Pool of Projected State Aid Recipients	134	290
Average FY 1990-91 State Financial Aid Award Package	$1,155	$1,462
First Year Cost of Financial Aid	$154,770	$423,980
Years in System	2	4
Cost by Degree Level	$309,540	$1,695,920
Total Cost of Additional Financial Aid	$2,005,460	

[10]Increased financial aid plus general fund needs: $2,005,460 + $2,097,434 = $4,102,894.

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